



Print Consistent Industrial Equipment Parts on Demand

Additive Manufacturing Streamlines the Production Process of Industrial Equipment Parts

When machine components need to be replaced, delays in delivery can be a nightmare for manufacturers. Keeping production up and running relies on the timely delivery of industrial equipment parts for applications including construction machinery, turbomachinery, HVAC, electronic equipment or electro-mechanical assemblies.

When supply chain issues affect prompt delivery, finding a way to ensure you have uninterrupted supply of the components you need will help lower production downtime.

Additive manufacturing is a powerful solution and eliminates reliance on third-party supply. The H350™ powered by SAF™ lets you print industrial equipment parts as needed. The technology provides manufacturers with the flexibility to print generic or bespoke parts in large volumes to any schedule. These parts can be designed and customized for various applications, leading to lower costs, less time spent in production and greater control over the workflow.



Print out fit-for-purpose industrial equipment parts in hours.

The H350 3D printer using SAF technology prints production-grade parts in small batches or at high volumes (tens of thousands) to meet varying needs and a wide range of applications. The print time for these end-use parts is on average less than 14 hours; far faster than traditional manufacturing, which can take weeks.

Parts printed with High Yield PA11 polymer powder on the H350 are consistent, impact- and chemical-resistant, durable and strong. PA11 is recyclable and unused powder can be added to future builds.

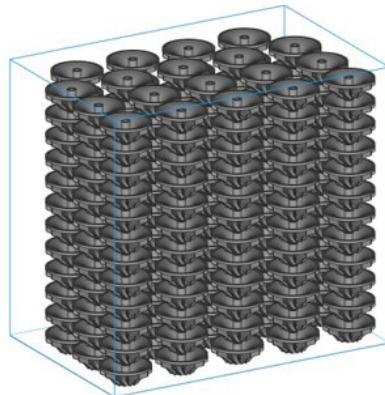
A 12% nesting density* means that more parts fit into a single build which saves time and costs. The H350 offers machine connectivity and records relevant manufacturing data to certify production. The print data can be retrieved for future builds at any time.

SAF's in-line, unidirectional architecture and tight thermal control during fusing and recoating across the print bed produces consistent and repeatable parts. These features allow SAF to print bulky and complex end-use parts without impacting part quality. SAF technology produces smooth surface finishes, fine feature details, flat areas, and thin or thick walls providing design freedom over any application.

*12% nesting density is an average standard and depends on the part's geometry.



Leverage full control over nesting to optimize design and part size.



Impeller

Potential Applications: turbomachinery, HVAC, air handling systems within a factory or vehicle

- Impellers are used to move fluid around systems. Only AM can make the intricate design of the propellor's vanes possible.

Build time: 9 hours for 228 impellers

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- High Yield PA11 allows thin walls that are robust and durable enough to maintain the impeller's circular shape.
- The top surface of the main body is smooth, as are the vanes so they can spin consistently to transfer energy from the pump's motor to the fluid.
- With H350 and SAF's geometric freedom, just one build process completes the part in its entirety.
- By placing the mounting shaft in the Z orientation, optimal concentricity of this feature is accomplished.
- The impeller can be nested tightly in the H350 to print large batches at a nesting density of around 12%.
- With the unique ability to nest parts in the same orientation, this extremely complex build can be achieved, not possible with traditional manufacturing or other AM solutions.
- This nesting orientation can be duplicated throughout the build using GrabCAD Print.
- The size and design of the impeller can easily be changed to suit different applications.

Achieve optimal volume at a cost-efficient price point.



Door Hinge Cover

Potential Applications: construction machinery, machine cabinets or testing equipment

- This part is typically used in any piece of equipment which contains a door.

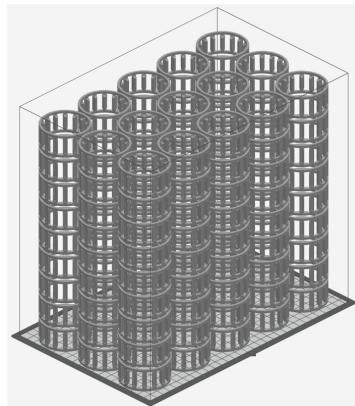
Build time: 9 hours 10 minutes for 18 door hinge covers

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- To ensure a proper fit, the locating shafts must be concentric, easily achieved with the H350 as end-use parts are consistent and repeatable.
- Durability and proper fit are crucial to ensure safety, especially when used inside the cab of a construction machine.
- High Yield PA11 polymer powder provides impact-resistance ensuring longevity of the part, even when it's liable to being repeatedly bashed and bumped.
- The hinge cover will maintain its integrity despite frequent opening and closing.
- Up to a few thousand hinge covers can be printed, an ideal volume range for this application.
- As only one side of the hinge is visible in situ, it's nested facing downwards to achieve the best aesthetics. SAF prints in near uniformity across all surfaces ensuring the part is failsafe during its life cycle.

Quick turnaround with the manufacturing agility to print a range of sizes.



Bearing Cage

Potential Applications: can be used in a variety of industrial equipment where rolling elements are present

- The bearing cage secures the rolling elements and moves with them. This prevents these elements from grouping together.

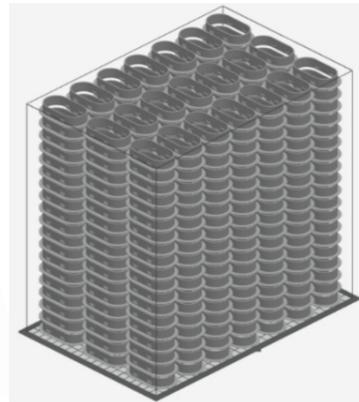
Printed Layer Time: 9 hours 15 minutes for 135 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- New industrial machinery or service and repair often requires custom-sized bearings which can be produced as required and there is no need to create, change or store tooling.
- Companies can respond quickly to demand while saving time and costs.
- High Yield PA11 is abrasion-resistant and the rollers or the cage of the bearing assembly are strong and accurate.
- High Yield PA11 is robust and impact-resistant which is required by moving parts such as the bearing cage.

Employ SAF's design flexibility to create compact and efficient parts.



Cable Pass-Through Grommet

Potential Applications: electronic equipment, electro-mechanical assemblies, wire protection when passing through holes in sheet metal

- A cable pass-through grommet covers sharp edges protecting wiring from movement or vibration.
- Safety and reliability of equipment is enhanced as the grommet prevents exposure of the conductor.

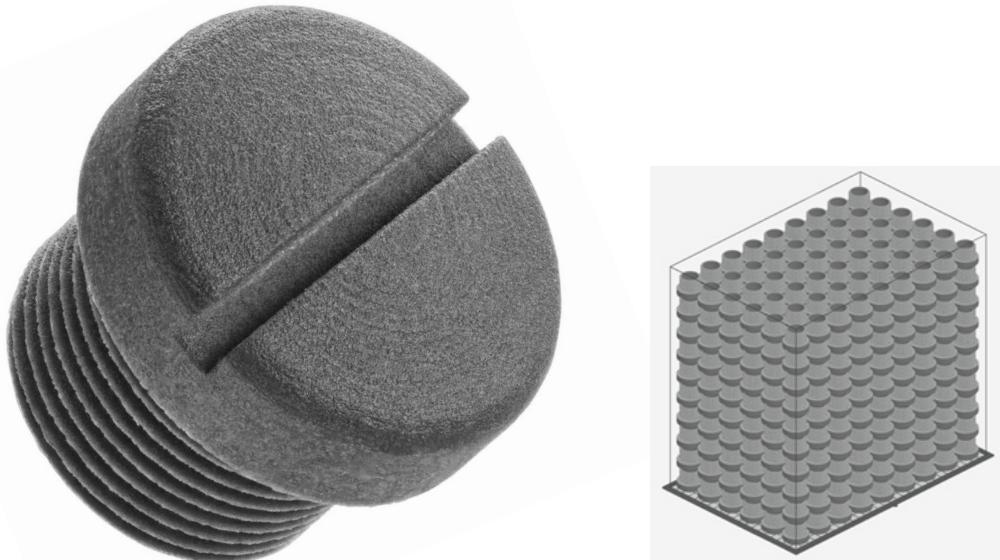
Printed Layer Time: 9 hours 30 minutes for 399 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- Limitations to a generic size or shape are lifted with the H350 which enables design freedom to create a pass-through grommet for any shape.
- With full control over the design, manufacturers can achieve tighter packaging of components and a more compact, efficient design.
- The H350 produces this part in high volumes with excellent accuracy and repeatability. This is especially important when producing features such as snap-fit clips.
- High Yield PA11 is ideal for this application since clips require impact resistance as well as a sufficient amount of give. This material creates parts with significant ductility which allows the clips to easily snap into place.

Increase productivity and optimize part output, lowering overall costs.



Dust Cap

Potential Applications: Multiple uses in industrial equipment to cover a grease port or an inspection port

- The main function of the dust cap is to prevent dust and other foreign objects from entering sensitive areas of the equipment.

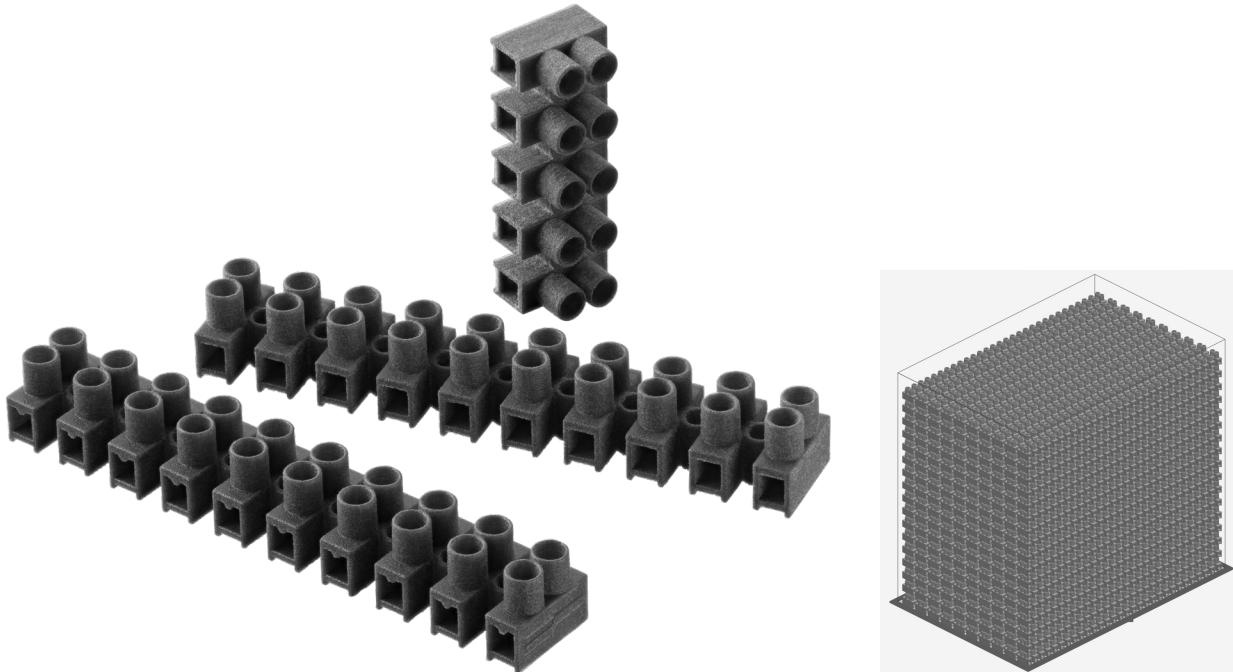
Printed Layer Time: 9 hours for 540 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- The feature resolution, accuracy and consistency of the H350 enables functional threads to be printed directly in place without the need to tap or post process.
- Dust caps can be produced quickly at a low cost, eliminating reliance on a supply chain.
- A stock of dust caps can be built up if nested around larger, more complex parts which do not nest well.
- By using GrabCAD Print's automated 3D nester tool, manufacturers can easily add a large number of small parts to an existing build.
- SAF technology's equal thermal management system and unidirectional architecture achieves an impressive 26% density in this build.
- The dust caps are sturdy and maintain their integrity as they are made with impact-resistant High Yield PA11.

Keep production on track by eliminating reliance on the supply chain.



Electrical Terminal Block

Potential Applications: any piece of industrial equipment that contains wires

- An electrical terminal block is used to join two banks of wires to continue a circuit.

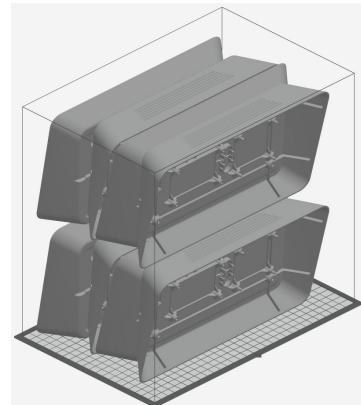
Printed Layer Time: 9 hours 15 minutes for 510 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- The H350 is able to produce accurate and repeatable fine features to accommodate connectors for finer gauge wires, and terminal blocks can be sized as required.
- Due to its shape and geometry, this is the perfect part to add to low density builds of larger, higher value parts.
- The H350's nesting freedom allows manufacturers to add parts anywhere in the build without the need for supports.
- GrabCAD Print's automated 3D nester tool quickly adds a large number of small parts to an existing build.
- A shortage of simple parts, such as electrical terminal blocks, can lead to a production stoppage. Removing reliance on the supply chain for these components benefits companies.
- High Yield PA11 polymer powder suits this type of application since it enhances impact-resistance and enables manufacturers to nest more parts in the build.

Create reproducible, accurate and complex designs.



Electronics Cover

Potential Applications: used as a service panel on a machine to provide access to certain components or a cover to keep equipment free from debris.

- This is an example of a larger electronics cover which may be used to shield delicate circuits within industrial equipment from foreign objects or dust.

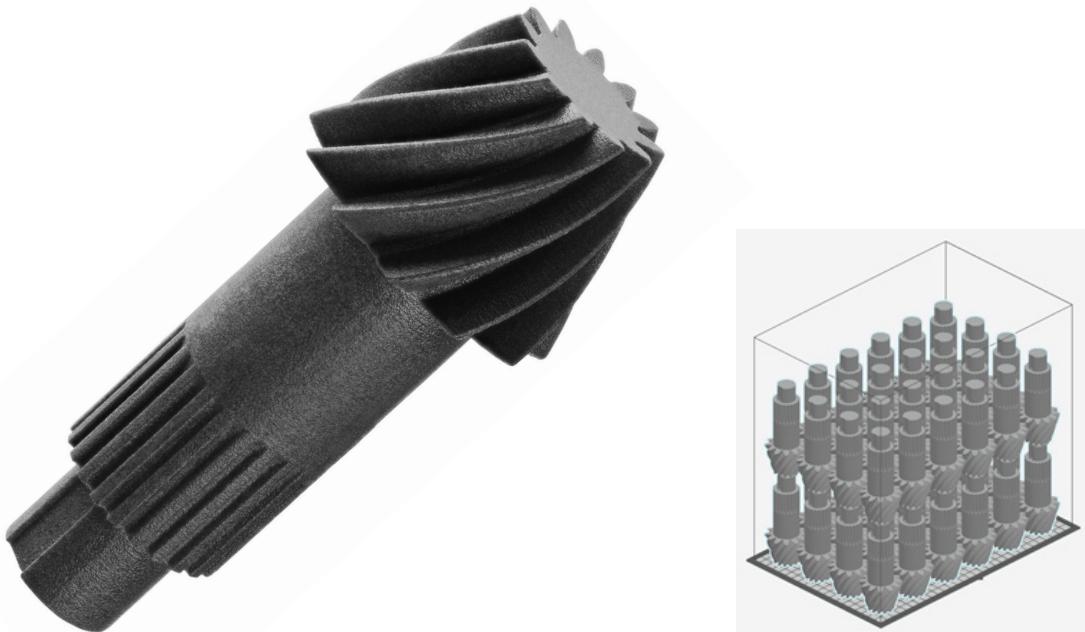
Printed Layer Time: 9 hours 5 minutes for 8 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- The H350 prints this thin and flat part without warp, a challenge for most other powder-bed technologies. The thermal control and consistency of the H350 enables the part to be produced accurately and free of surface defects.
- Since SAF doesn't require supports, other small parts can be nested around the build, increasing productivity and reducing cost per part.
- By using High Yield PA11, these covers are impact-resistant which is crucial for this application since delicate circuits located inside the cover must be protected.

Accomplish difficult geometries while remaining cost-efficient.



Beveled Helical Gear

Potential Applications: this type of gear is suitable for light duty applications where power transfer from its source to another location within the system is required.

- The gear could serve as a point of controlled failure within the system which would protect other, more expensive components.

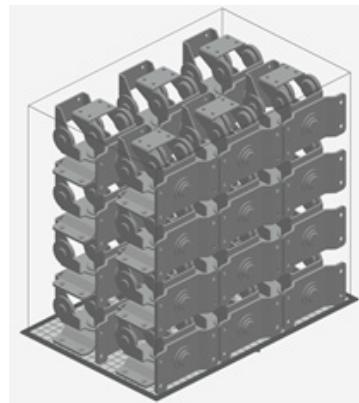
Printed Layer Time: 8 hours 20 minutes for 48 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- The part features a helically cut, beveled gear, a splined shaft and a keyway. Traditional manufacturing of these intricate features would make for a complex and expensive molding and machining process.
- SAF technology supports the production of complex geometries in a single process.
- Typically, a low load application like this may be restricted to simple, off-the-shelf polymer gears which require adaptations to the design in order for the gear to work.
- Using SAF, the geartrain can be optimally designed inclusive of a complex arrangement of gears without incurring additional expense during manufacture.
- The H350 can achieve 26% nesting density, leading to a higher output at lower costs.

Accelerate production and maintain costs with a print-in-place part.



Multi-Axis Hinge Assembly

Potential Applications: can be implemented within panels, doors and lids of industrial equipment

- This type of hinge allows doors or panels on industrial equipment to be tilted to any angle.

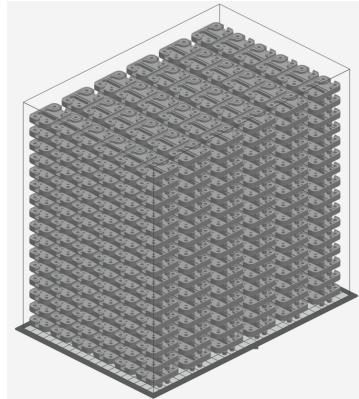
Printed Layer Time: 9 hours 25 minutes for 48 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- Typically, this hinge is a print-in-place assembly of several parts to achieve hinging in two different axes.
- Best suited for lighter duty operation, printing this hinge with SAF technology reduces costs since the entire assembly can be printed at once with no assembly required after printing.
- The assembly features tight tolerances which require excellent selectivity in fusion and precise thermal control, made possible by the H350.

Easily implement design customizations to fulfill varying needs.



Fluid System 2-into-6 Manifold

Potential Applications: industrial fluid management systems

- This manifold is an example of a small component from a fluid management system.
- It's used to take two incoming fluid paths and split them into six outgoing pipes.

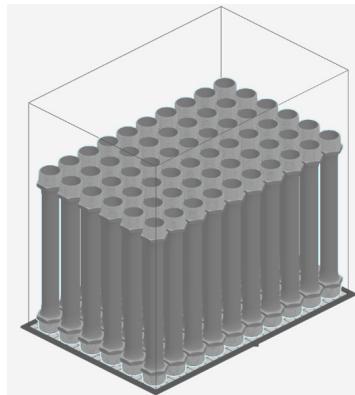
Printed Layer Time: 9 hours 20 minutes for 576 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- The design can be customized to fit various sized pipes, outgoing angles and pipe fittings depending on system requirements.
- The size of the manifold is small enough to nest a large number of parts in a single build, enabling higher volume production of end-use parts.
- Although the geometry is sufficiently complex, the design freedom afforded by SAF allows for customization.
- High Yield PA11 maintains excellent chemical resistance, suitable for managing corrosive fluids.
- This part requires full powder removal before use. It may also require some post processing to smooth or seal the surface if required.

Apply design changes and developments simultaneously.



Fluid System Threaded Pipe

Potential Applications: low-pressure fluid management systems to control the fluid transfer of a gas or liquid

Printed Layer Time: 9 hours 20 minutes for 576 parts

Material: High Yield PA11

Advantages of printing with the H350 powered by SAF technology:

- Due to SAF technology's design freedom, there is scope to increase the complexity, efficiency and value of the part.
- The design can include custom bend radii, variable wall thicknesses and flow conditioning properties. This could be implemented as swirling to maintain suspension in the transportation fluid.
- With modified wall thickness, a low-pressure system can be better managed.
- Features such as threads are accurately created without requiring additional manufacturing stages. A 12% nesting density lowers production costs and accelerates time-to-market.
- High Yield PA11 is chemical- and impact-resistant making it ideal for fluid system threaded pipes.



Print exactly what you need, when you need it.

The H350 using SAF technology will deliver consistent, accurate and repeatable parts. Manufacturers now have the design freedom to tailor parts to their exact specifications. Most importantly, the H350 has broken new ground in volume production leading to reduced costs. The printer's nesting function stacks parts for volume - even different parts can be nested in the same build. Each build produces consistent and identical parts and this can be repeated from build-to-build and on any H350 printer.

The H350 delivers quality parts, fast turnaround times at a lower cost to streamline production.

Explore the H350 and SAF technology at:

<https://www.stratasys.com/en/3d-printers/printer-catalog/saf/h350/>

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